REMARKS

The Final Office Action mailed November 28, 2003, has been received and reviewed. Claims 1 through 4 and 15 through 25 are currently pending in the application. Claims 1 through 4 and 15 through 25 stand rejected. Applicant proposes to amend claims 1 through 4, 15 through 19 and 21 through 23, and respectfully requests reconsideration of the application as proposed to be amended herein.

Applicant notes that many of the proposed amendments are solely for the purpose of replacing the occurrence of "said" with the word "the" in order to improve the readability of the claims and not for purposes of avoiding the prior art or otherwise limiting the scope of the claims.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 5,088,190 to Malhi et al.

Claims 1 through 4, 15 through 17, and 19 through 25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Malhi et al. (U.S. Patent No. 5,088,190). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claims 1 through 4

Independent claim 1, as proposed to be amended herein, is directed to an apparatus for routing interconnections among bond pads on a semiconductor die. The apparatus comprises: a sheet-like, nonconductive structure having a first surface, and *a second, opposing surface* for *attachment to the semiconductor die*; and a plurality of electrically conductive discrete pads *attached to the first surface*, the plurality of electrically conductive discrete pads each having an

electrical connect portion and an electrically isolated portion comprising a portion facing the first surface and a periphery defined thereabout.

The Examiner cites Malhi as disclosing a semiconductor die comprising: "a sheet-like, nonconductive structure 30 having a first surface, and a second surface for attachment to the semiconductor die 11; and a plurality of electrical conductive discrete pads 32 attached to the first surface, the plurality of electrically conductive discrete pads each having an electrical connection portion 32 and an electrical isolated portion 31 comprising a portion facing the first surface and a periphery defined thereabout." (Final Action, page 2).

Applicant maintains the position previously set forth in the Amendment mailed on September 11, 2003, with respect to Malhi's teachings regarding a plurality of electrically conductive discrete pads. However, Applicant specifically notes that, even if the Examiner relies on the connection circuit 32 of Malhi as meeting the limitation of a plurality of electrically conductive discrete pads as set forth in claim 1, Malhi fails to teach that such the connection circuit 32 is disposed on a first surface of a sheet-like conductive structure while a second, opposing surface of the sheet-like conductive structure is for attachment to a semiconductor die. Rather, the first surface of Malhi's compliant layer 31 (i.e., the surface on which the connection circuit is disposed) is placed in a juxtaposed, spaced apart arrangement with the semiconductor die 11. The second, opposing surface of the compliant layer 31 adjoins a substrate 30 of the burn-in socket and, therefore, is clearly not for attachment to the semiconductor die 11 as is required by claim 1 of the presently claimed invention.

Applicant, therefore, submits that claim 1 is not anticipated by Malhi. Applicant further submits that claims 2 through 4 are also allowable as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 2, Applicant submits that Malhi fails to disclose at least one conductor extending between at least two of the plurality of electrically conductive discrete pads, wherein at least a portion of the at least one conductor is external to the sheet-like nonconductive structure. While Malhi discloses conductors (wire bonds 25) extending from the connection circuit 32 to connector pins 26, Applicant notes that the connector pins are not attached to the surface of the compliant layer. Moreover, Applicant fails to find any teaching regarding a

conductor extending from one electrically conductive discrete pad formed on the compliant layer to another wherein at least a portion of the conductor is external to the sheet-like nonconductive structure.

Applicant, therefore, respectfully requests reconsideration and allowance of claims 1 through 4.

Claims 15, 16 and 18 through 21

Independent claim 15, as proposed to be amended herein, is directed to a semiconductor device which comprises: a die including a plurality of bond pads disposed on a surface thereof and a plurality of conductive bumps, each being disposed on one of the plurality of bond pads; an adapter *adhered to the surface of the die*, the adapter having a first plurality of discrete electrical contacts on a first surface thereof, *each of the first plurality of discrete electrical contacts being contiguous with one of the plurality of conductive bumps*, and a second plurality of discrete electrical contacts on a second surface thereof, *each of the second plurality of discrete electrical contacts having an electrical connection portion and an electrically isolated portion comprising a portion facing the second surface of the adapter and a periphery defined thereabout*, at least some of the second plurality of discrete electrical contacts in electrical communication with the first plurality of discrete electrical contacts; and *a second plurality of conductive bumps, each extending from one of the second plurality of discrete electrical contacts.*

The Examiner cites Malhi as disclosing a semiconductor die comprising: "a sheet-like, nonconductive structure 30 having a first surface, and a second surface for attachment to the semiconductor die 11; and a plurality of electrical conductive discrete pads 32 attached to the first surface, the plurality of electrically conductive discrete pads each having an electrical connection portion 32 and an electrical isolated portion 31 comprising a portion facing the first surface and a periphery defined thereabout." (Office Action, page 2). The Examiner further cites Malhi, referring to FIG. 6 thereof, as disclosing "an adapter on the side with [a] plurality of contacts 626." (Final Action, page 2). Applicant respectfully traverses this rejection.

Applicant submits that Malhi fails to teach an adapter adhered to a surface of a die wherein the adapter is configured according to the additional recitations of claim 15. More

particularly, Malhi does not teach an adapter having a first plurality of discrete electrical contacts on a first surface thereof and which are each contiguous with one of the plurality of conductive bumps of the die. Nor does Malhi teach a second plurality of discrete electrical contacts on a second surface of the adapter, the second plurality of discrete electrical contacts each having an electrical connection portion and an electrically isolated portion comprising a portion facing the second surface of the adapter and a periphery defined thereabout. Additionally, Malhi fails to teach a second plurality of conductive bumps, each extending from one of the *second plurality of discrete electrical contacts.*

Regardless of how the Examiner views the connection circuit 32 and the connection pins 626 (i.e., regarding which one is perceived to be a first plurality of discrete contacts and which is perceived to be a second plurality of discrete contacts), Malhi fails to teach all of the limitations of claim 15 including a second plurality of conductive bumps which each extend from one of the *second plurality of discrete electrical contacts,* as well as the *first plurality of discrete electrical contacts each being contiguous with a conductive bump of the die.*

As such, Malhi clearly fails to anticipate claim 15. Applicant further submits that claims 16 and 18 through 21 are allowable over Malhi as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 20, Malhi fails to teach that at least one of the second plurality of discrete electrical contacts is electrically isolated from the plurality of bond pads disposed on the first surface of the die. Nor does the Examiner point to any specific teaching in Malhi regarding such subject matter.

With respect to claim 21, Malhi fails to teach a semiconductor device with a layer of adhesive between the adapter and the die.

Applicant, therefore, respectfully requests reconsideration and allowance of claims 15, 16 and 19 through 21.

Claims 17 and 19 through 25

Independent claim 17, as proposed to be amended herein, is directed to a semiconductor device which comprises: a die including a plurality of bond pads disposed on a first surface

thereof; an adapter *adhesively secured to the die*, the adapter having a first plurality of discrete electrical contacts on a first surface thereof, each electrically connected to one of the plurality of bond pads, and a second plurality of discrete electrical contacts on a second surface thereof, at least some of the second plurality of discrete electrical contacts being horizontally remote from at least some of the plurality of bond pads disposed on the first surface of the die, the at least some of the second plurality of discrete electrical contacts having an electrically isolated portion comprising a portion facing the second surface of the adapter and a periphery defined thereabout, and at least some other of the second plurality of discrete electrical contacts being electrically connected to the first plurality of discrete electrical contacts.

The Examiner cites Malhi as disclosing a semiconductor die comprising: "a sheet-like, nonconductive structure 30 having a first surface, and a second surface for attachment to the semiconductor die 11; and a plurality of electrical conductive discrete pads 32 attached to the first surface, the plurality of electrically conductive discrete pads each having an electrical connection portion 32 and an electrical isolated portion 31 comprising a portion facing the first surface and a periphery defined thereabout." (Final Action, page 2). The Examiner further cites Malhi, referring particularly to FIG. 6 thereof, as disclosing "an adapter on the side with [a] plurality of contacts 626." (Final Action, page 2). Applicant respectfully traverses this rejection.

Applicant notes that Malhi teaches a burn-in socket configured to receive a semiconductor die therein. A lid is utilized to press the semiconductor die against a connection circuit of the burn-in socket. The burn-in socket is configured such that the die is removable therefrom after appropriate testing of the die has occurred. There is clearly no teaching in Malhi regarding the burn in socket or any component thereof being adhesively secured to the die. As such, Applicant submits that claim 17 is clearly allowable over Malhi.

Applicant further submits that claim 22 through 25 are allowable as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 22, as proposed to be amended herein, Malhi fails to teach a semiconductor device wherein the adapter comprises a sheet-like, nonconductive structure and wherein the first plurality of discrete electrical contacts is disposed on a first surface of the sheet-

like nonconductive structure and, wherein the second plurality of discrete electrical contacts is disposed on a second, opposing surface of the sheet-like nonconductive structure.

With respect to claim 23, Applicant submits that Malhi fails to teach a conductive via extending between at least one of the first plurality of discrete electrical contacts (on the first surface of the sheet-like, nonconductive structure) and at least one of the at least some other of the second plurality of discrete electrical contacts (on the second surface of the sheet-like, nonconductive structure).

With respect to claim 24, Applicant submits that Malhi fails to teach an adapter as set forth in claim 17 which comprises a tape-like structure.

With respect to claim 25, Malhi fails to teach that at least one of the second plurality of discrete electrical contacts is electrically interconnected with a second die.

Applicant, therefore, respectfully requests reconsideration and allowance of claims 17 and 22 through 25.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,088,190 to Malhi et al. and Further in View of U.S. Patent No. 4,712,129 to Orcutt

Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Malhi et al. (U.S. Patent No. 4,712,129), as applied to claim 15 above, and further in view of Orcutt (U.S. Patent No. 4,712,129). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claim 18 is improper because the references fail to teach or suggest all of the limitations of the presently claimed invention and because there is a lack of motivation to combine the references in the manner suggested by the Examiner.

Claim 18 of the presently claimed invention depends from claim 15. Claim 18 recites that the adapter set forth in claim 15 further comprises a material having a coefficient of thermal expansion substantially matching the coefficient of thermal expansion of the die. The Examiner relies on Malhi as teaching all the limitations of claim 15, and then cites Orcutt as teaching the matching of coefficients of thermal expansion between various parts of a semiconductor package (Final Action, page 3). The Examiner states that "it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the matching TCE of Orcutt's in Malhi's in order to prevent the cracking between the die and the substrate." (Final Action, page 3).

As addressed above with respect to claim 15, Malhi fails to teach or suggest all of the limitations of claim 15. Particularly, Malhi fails to teach or suggest an adapter which includes a first plurality of discrete electrical contacts on a first surface thereof, and which are each contiguous with one of the plurality of conductive bumps of the die. Nor does Malhi teach or suggest a second plurality of discrete electrical contacts on a second surface of the adapter, the second plurality of discrete electrical contacts each having an electrical connection portion and an electrically isolated portion comprising a portion facing the second surface of the adapter and a periphery defined thereabout. Additionally, Malhi fails to teach or suggest a second plurality of conductive bumps, each extending from one of the *second plurality of discrete electrical contacts*. Orcutt likewise fails to teach or suggest such subject matter.

Moreover, while the Examiner states that it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the matching TCE of Orcutt's in Malhi's in order to prevent the cracking between the die and the substrate, Applicant notes that the die 11 appears to have no direct contact with the burn-in socket of Malhi (beyond the electrical contact of the die's solder bumps 33 with the connection circuitry 32). Thus, there is no concern of cracking occurring between Malhi's die 11 and any portion of the burn-in socket.

Thus, Applicant submits that one of ordinary skill in the art would lack motivation to combine Malhi and Orcutt in the manner suggested by the Examiner.

With the combination of Malhi and Orcutt failing to teach or suggest all of the limitations of the presently claimed invention as set forth in claim 15, and lacking motivation to combine the references in the manner suggested by the Examiner, Applicant submits that claim 18 is allowable over Malhi and Orcutt, taken either individually or in combination, and respectfully request reconsideration and allowance thereof.

ENTRY OF AMENDMENTS

The proposed amendments to claims 1 through 4, 15 through 19 and 21 through 23 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, Applicant submits that the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 1 through 4 and 15 through 25 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,

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